

**EMBRY-RIDDLE AERONAUTICAL UNIVERSITY**  
Daytona Beach Campus

**AE 434: Spacecraft Control**  
**Spring 2023**

**Homework 1**

Due: January 23 at 11:59PM

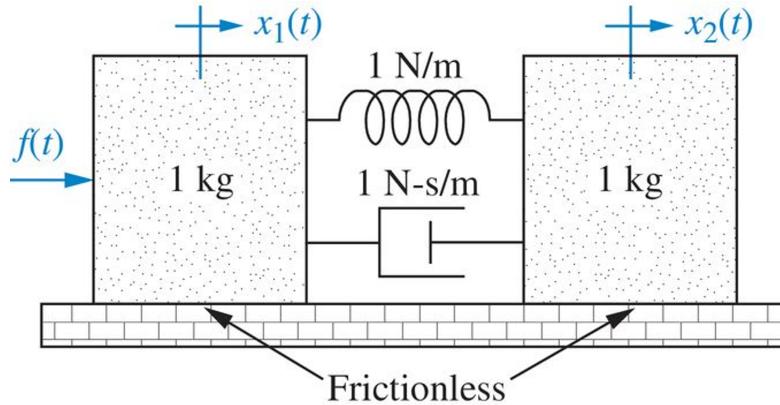
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1. Linearize the nonlinear equation

$$z = x^2 + 7xy - 3y^2 - 3x$$

in the vicinity of the equilibrium point at  $x_e = 1$ ,  $y_e = 2$ .

2. Find the transfer function  $G(s) = \frac{X_2(s)}{F(s)}$  (the response of the second mass to the stimulus in terms of force) for the mechanical system shown below:



**Hint:** Obtain the equations of motion first, then apply Laplace transforms.